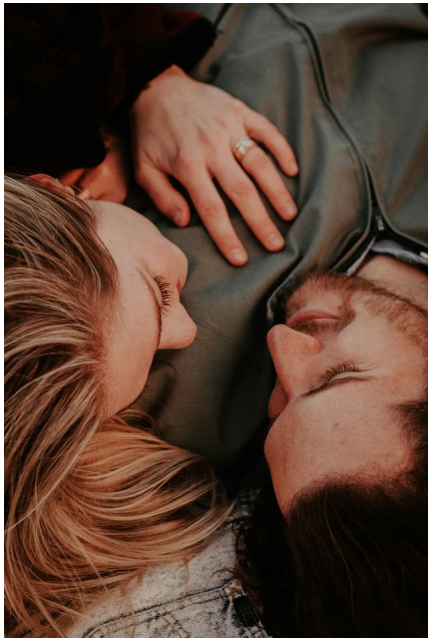

School of Full Stack
Logistic Regression

Contents

When to use Logistic Regression

We use logistic regression to predict binary outcome (0/1)

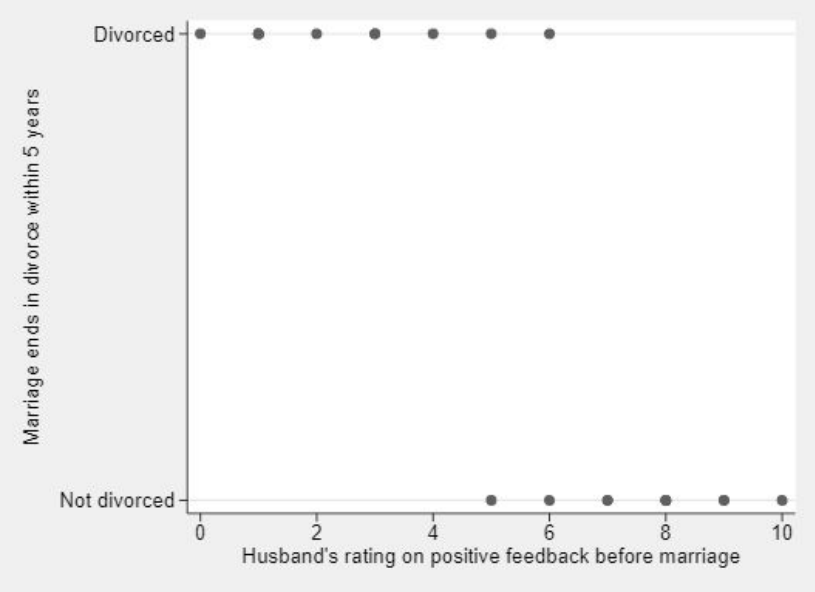


happiness	divorce
10	0
8	0
9	0
7	0
8	0
5	0
9	0
6	0
8	0
7	0
1	1
1	1
3	1
1	1
4	1
5	1
6	1
3	1
2	1
0	1

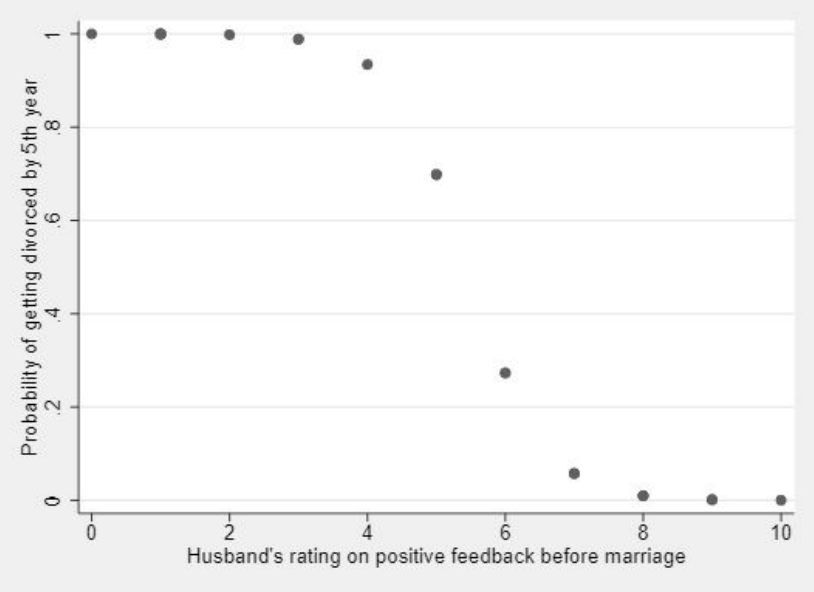
```
divorced = f( happiness level )
```

An example

`divorced = f( happiness level )`



Actual Data

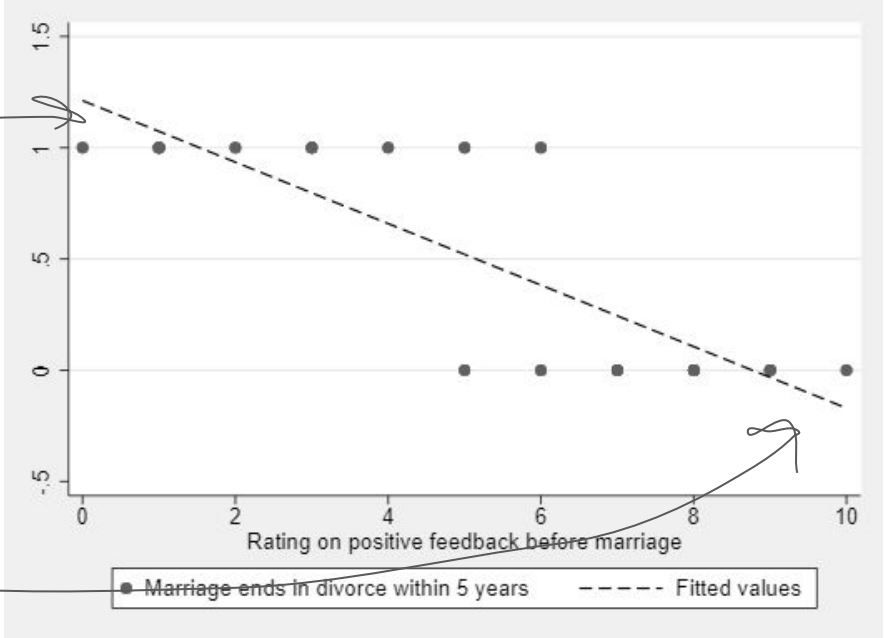


Model

Why Linear Regression is not a good model?

Higher than 1

Lower than 0



A little math behind this model

Formula >

$$S(x) = \frac{1}{1 + e^{-x}}$$

$S(x)$ = sigmoid function

e = Euler's number

Sigmoid Function

output will be within 0 to 1

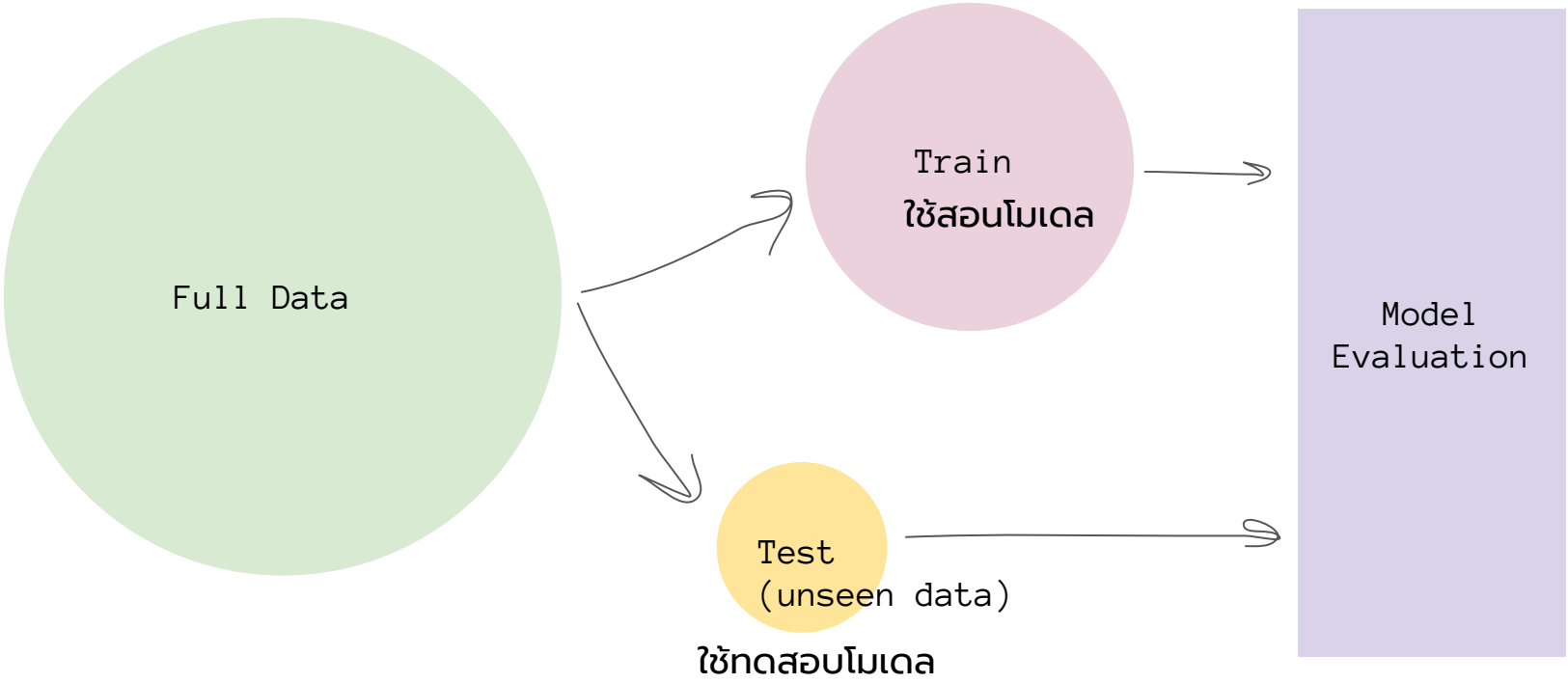
There are two sigmoid formula

$$sigmoid = e^{z} / (1 + e^{z})$$

อีกสูตร sigmoid
ได้ผลลัพธ์เหมือนกัน

แอดชอบเรียกเป็นค่า z มากกว่า

Model Training



Model Evaluation

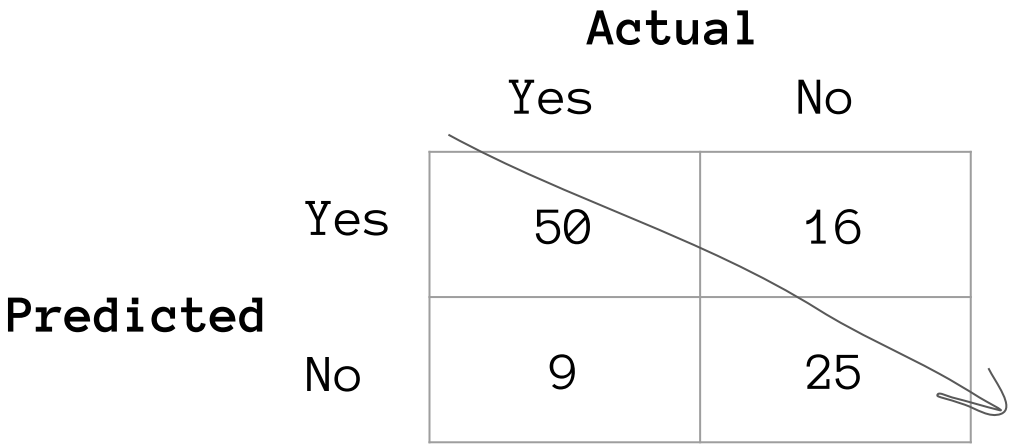
How good is our model?

Rule of thumb: we evaluate our model using our test/ unseen data set

Model Evaluation - Confusion Matrix

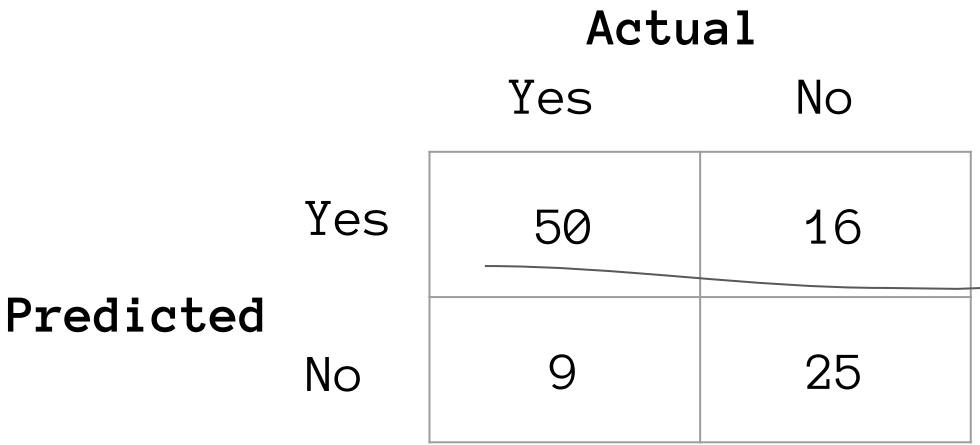
		Actual	
		Yes	No
Predicted	Yes	50	16
	No	9	25

Model Evaluation - Confusion Matrix



Accuracy
(50+25) / 100 = 75%

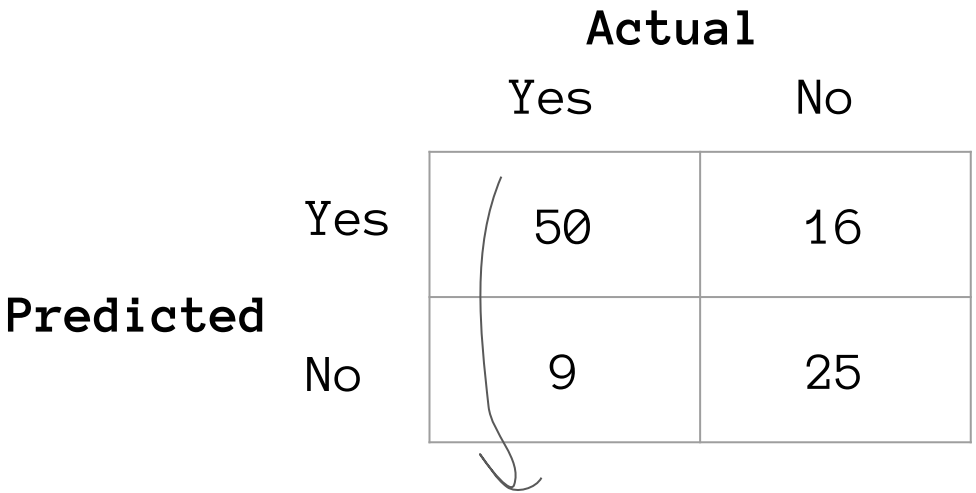
Model Evaluation - Confusion Matrix



Precision

50 / (50+16) = 75.7%

Model Evaluation - Confusion Matrix



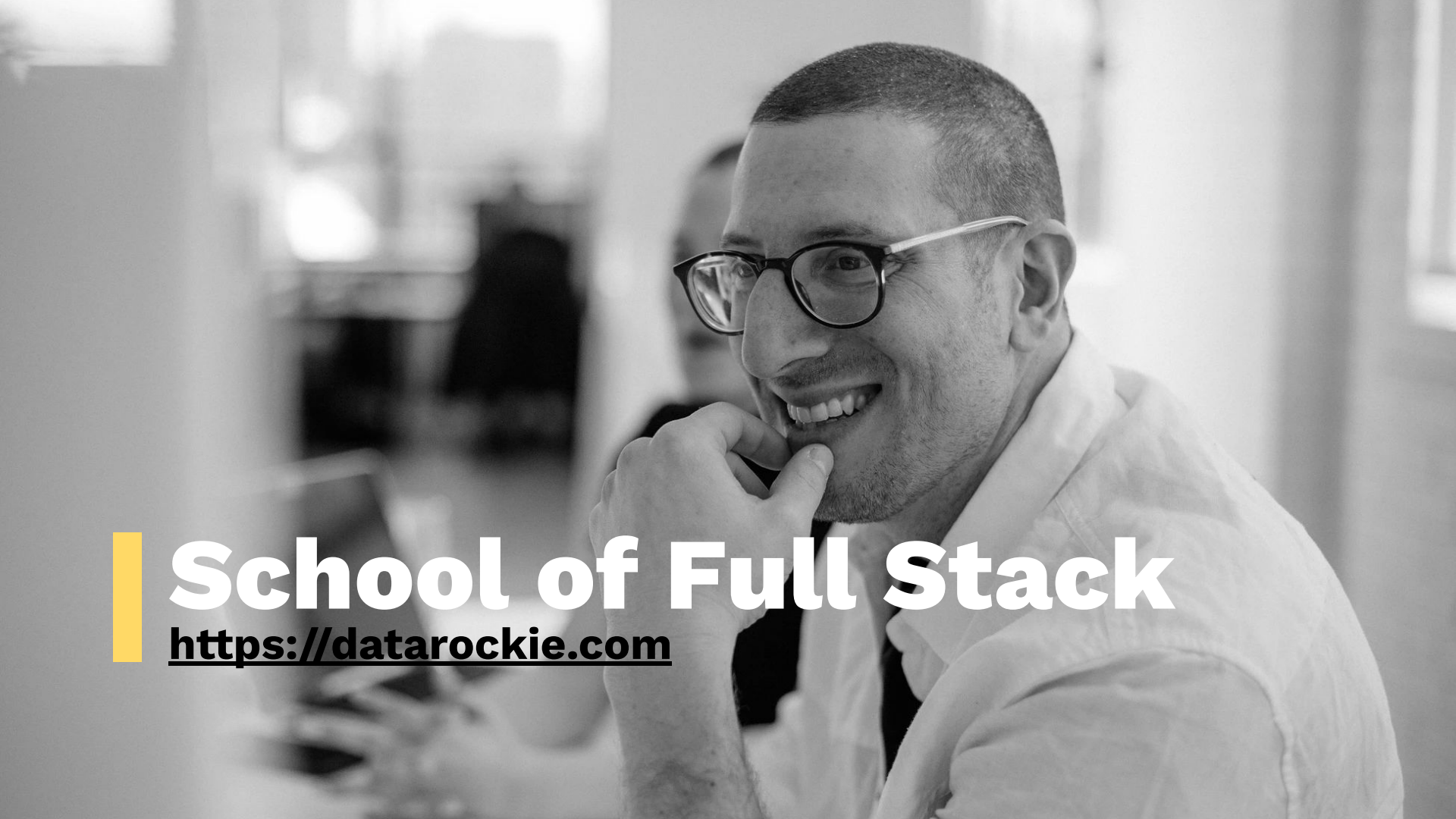
Recall

50 / (50+9) = 84.7%

Model Evaluation - F1 Score

$$F_1 = \frac{2}{\mathrm{recall}^{-1} + \mathrm{precision}^{-1}} = 2 \cdot \frac{\mathrm{precision} \cdot \mathrm{recall}}{\mathrm{precision} + \mathrm{recall}}$$

F1 is a harmonic **mean** between precision and recall (or average)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